

Identification and enhancement of secondary metabolites in medicinal and aromatic plants for potential use as biological pesticides and pharmacologicals

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In line with the national policy on bio-economy this project seeks to provide an important contribution in generating bio-based products supporting the management of the global change from fossil fuels to renewable resources, processes and services. It aims to get a better understanding of mechanisms and processes at the genetic and molecular levels of medicinal plant and secondary compound production and to apply this understanding also to improving individual agricultural processes. Specifically we suggested to

- 1.) adapt and apply metabolomics approaches to identify secondary plant metabolites as active structures/compounds against agricultural plant infestations;
- 2.) enhance the content of biologically and pharmacologically active substances by selecting genetic raw materials from extreme environments;
- 3.) enhance the production of these metabolites by mimicking extreme environmental conditions (global climate change) during cultivation.

It is aimed to obtain plant extracts, which can be used as bio-based plant protection products (pesticides). In the end of the project, the collaboration should provide a selection of new “highly-efficient”

plants, which are characterized by optimal quality and high resistance, especially with regard to influences of the global climate change. Research studies are planned to evaluate the individual influence of genetic background of selected plant species and cultivars in Iran with respect to optimal quality, resistance and stress tolerance. In this context suitable (fast) analytical screening methods (e.g. LC-MS, GC-MS, vibrational spectroscopy techniques) will be applied to obtain objective data from the individual metabolic profile. In-vitro and in-vivo bioassays of the antifungal and antibacterial activities of the selected substances will be performed. The metabolite data sets will be correlated with the bioassay data.

Here I will show results of an antifungal assay on 8 Iranian medicinal plants which helped to select the two plant species which will be used as model plants. In summer 2018 14 populations of *Zataria multiflora* and 10 population of *Ferula assa-foetida* were sampled in different regions of Iran. First results from chemical analyses of plant and soil samples will be presented.